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LE 'HOME' ENTERED AT 13:16:41 ON 04 JUN 2003)

     FILE 'CAPLUS' ENTERED AT 13:17:47 ON 04 JUN 2003
L1             0 S PHOTONC (2A) CRYSTAL?
L2          2939 S PHOTONIC (2A) CRYSTAL?
L3           563 S L2 AND (3D OR (THREE (1W) DIMENSION?))
L4            12 S L3 AND VOID
                 SET SMA OFF
                 SEL RAN.CAPLUS(10) L4 8
                 SET SMA LOGIN
L5             1 S E1

     FILE 'INSPEC' ENTERED AT 13:24:34 ON 04 JUN 2003
L6           654 S L3
L7             5 S L4

     FILE 'STNGUIDE' ENTERED AT 13:26:04 ON 04 JUN 2003

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L7 ANSWER 3 OF 5 INSPEC COPYRIGHT 2003 IEE
AN 1999:6424878 INSPEC DN A2000-02-4265-004
TI Photonic bandgap formation and tunability in certain self-organizing systems.
AU John, S.; Busch, K. (Dept. of Phys., Toronto Univ., Ont., Canada)
SO Journal of Lightwave Technology (Nov. 1999) vol.17, no.11, p.1931-43. 70 refs.
Doc. No.: S0733-8724(99)08846-5
Published by: IEEE
Price: CCCC 0733-8724/99/$10.00
CODEN: JLTEDG ISSN: 0733-8724
SICI: 0733-8724(199911)17:11L.1931:PBFT;1-G
DT Journal
TC Theoretical
CY United States
LA English
AB We describe the microfabrication and band structure of large scale **three-dimensional** (**3D**) photonic bandgap (PBG) materials based on self-organizing templates. The simplest of these templates is an fcc lattice of close-packed, weakly sintered spheres. Other templates include hcp and hexagonal AB2 self-organizing **photonic crystals**. These **photonic crystals** may be converted into PEG materials by partially infiltrating the template with high refractive index semiconductors such as Si, Ge, or GaP and subsequently removing the template. The resulting "inverse opal" structure exhibits both a photonic pseudogap and a complete (**3D**) PBG in the near visible spectrum, spanning up to 15% of the gap center frequency. The local density of states (LDOS) for photons exhibits considerable variation from point to point in coordinate space and reveals large spectral gaps even in the absence of a PEG in the total density of states. These gaps in the LDOS may lead to novel effects in quantum and nonlinear optics when active atoms or molecules are placed within the PBG material. These effects include anomalous, low threshold nonlinear response, collective atomic switching, and low-threshold all-optical transistor action. When an optically birefringent nematic liquid crystal is infiltrated into the **void** regions of the "inverse" opal PBG material, the resulting composite material exhibits a completely tunable PBG. In particular, the **3D** PBG can be completely opened or closed by applying an electric field which rotates the axis of the nematic molecules relative to the inverse opal backbone.
CC A4265 Nonlinear optics; A4250 Quantum optics; A7820P Photonic band gap (condensed matter); A7820D Optical constants and parameters (condensed matter); A7820J Electro-optical effects (condensed matter)
CT ELECTRO-OPTICAL EFFECTS; NONLINEAR OPTICS; PHOTONIC BAND GAP; REFRACTIVE INDEX; SELF-ASSEMBLY
ST self-organizing systems; photonic bandgap; tunability; microfabrication; FCC lattice; refractive index; inverse opal structure; photonic pseudogap; near visible spectrum; local density of states; low threshold nonlinear response; collective atomic switching; all-optical transistor; optically birefringent nematic liquid crystal; applied electric field